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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/724,603	12/02/2003	Hirohisa Saito	50389-048	2606

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McDERMOTT, WILL & EMERY  
600 13th Street, N.W.  
Washington, DC 20005-3096

EXAMINER
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GRAYBILL, DAVID E

ART UNIT	PAPER NUMBER
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2822

DATE MAILED: 09/19/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/724,603

Applicant(s)

SAITO ET AL.

Examiner

David E. Graybill

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2822

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 05 July 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) 11-14 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
  - 2) ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 2 pages.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

Claims 11-14 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 7-5-5.

In the rejections infra, generally, reference labels are recited only for the first recitation of identical claim elements.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Fabis (6211463) and Nishibayashi (6171691).

In the abstract, and at column 1, line 59-63; column 2, line 45 to column 4, line 23; and column 6, lines 9-10 and 26-27, Fabis discloses a package for housing semiconductor chip comprising: a substrate 12, whose upper face 18 is provided with a mounting space 40 whereon a semiconductor chip 28 is mounted, and whose opposite sides are provided with a screw mounting part that is a through-hole 21 or notch, and at least a portion of the substrate below the mounting space comprising a metal-diamond composite 32/38 comprising diamond 32, and wherein, a remaining part that includes the screw mounting part consists of a metal; a frame 22 on the upper face of the substrate so as to surround the mounting space, the frame having a joint for an input/output terminal at a side or top thereof; and an input/output terminal 24 being connected to the joint; wherein at least a portion of a surface of said substrate comprising the metal and the metal-diamond composite, and/or a portion of a surface of said frame, and/or a portion of a surface of said input/output terminal is plated with gold; wherein the metal of the substrate, which comprises comprising the metal and the metal-diamond composite is a metal or a metal alloy containing at least one element selected from Cu, Fe, Mo, W, Ni, Co and Cr;

wherein a thermal expansion coefficient of the metal of said substrate, which comprises the metal and the metal-diamond composite, is the same as or greater than a thermal expansion coefficient of the metal-diamond composite; wherein a method for joining said metal and said metal-diamond composite is brazing 37; wherein a method for joining said metal and said metal-diamond composite is a method inherently involving diffusion of the metals; wherein inherently a method for joining said metal and said metal-diamond composite is tight-fit bonding.

A semiconductor device comprising: a package for housing semiconductor chip comprising: a substrate 12, whose upper face 18 is provided with a mounting space 40 whereon a semiconductor chip 28 is mounted, and whose opposite sides are provided with a screw mounting part that is a through-hole 21 or notch, and at least a portion of the substrate below the mounting space comprising a metal-diamond composite 32/38 comprising diamond 32, and wherein, a remaining part that includes the screw mounting part consists of a metal; a frame 22 on the upper face of the substrate so as to surround the mounting space, the frame having a joint for an input/output terminal at a side or top thereof; and an input/output terminal 24 being connected to the joint; a semiconductor chip being mounted on and fixed to the mounting space; and a lid 26 being joined to an upper face of the frame.

To further clarify, the brazing method of Fabis is inherently tight-fit bonding because it inherently results in a tight fit. In any case, the product of Fabis inherently possesses any structural characteristics imparted by the process limitation. See *In re Fitzgerald, Sanders, and Bagheri*, 205 USPQ 594 (CCPA 1980).

However, Fabis does not appear to explicitly disclose a metal-diamond composite comprising diamond grains, a metal carbide covering a surface of the diamond grains, and a metal containing silver and/or copper as a main component and laying between the diamond grains by infiltrating therebetween; wherein an average grain diameter of the diamond grains is 10 to 700  $\mu\text{m}$ ; wherein an average grain diameter of the diamond grains is 50 to 700  $\mu\text{m}$  at a center of the metal-diamond composite and 10 to 60  $\mu\text{m}$  at a circumference thereof.

Nevertheless, at column 5, line 48 to column 7, line 67, Nishibayashi discloses a metal-diamond composite 10 comprising diamond grains 1, a metal carbide 2 covering a surface of the diamond grains, and a metal 3 containing silver and/or copper as a main component and laying between the diamond grains by infiltrating therebetween; wherein an average grain diameter of the diamond grains is "10 to 700  $\mu\text{m}$ "; wherein an average grain diameter of the diamond grains is 50 to 700  $\mu\text{m}$  "10 to 700  $\mu\text{m}$ " at a center of the metal-diamond composite and 10 to 60  $\mu\text{m}$  "10 to 700  $\mu\text{m}$ " at a

circumference thereof. Moreover, it would have been obvious to combine this disclosure with the disclosure of Nishibayashi by substituting and/or combining the metal-diamond composite 10 for and/or with the metal-diamond composite 32/38 of Fabis because it would provide a substrate having a coefficient of thermal expansion close to that of the chip and having an extremely high thermal conductivity.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fabis and Nishibayashi as applied to claim 7 supra, and further in combination with Krassowski (6758263).

Although Fabis and Nishibayashi do not appear to explicitly disclose the process limitation that the method for joining said metal and said metal-diamond composite is tight-fit bonding, as cited, the combination of Fabis and Nishibayashi discloses the method for joining said metal and said metal-diamond composite is "other bonding methods." Furthermore, , at column 14, lines 24-31; and column 15, lines 4-6, Krassowski discloses tight-fit bonding "shrink fit," as applicant has exemplified tight-fit bonding in the instant specification, at paragraph 80. In addition, it would have been obvious to combine this disclosure of Krassowski with the disclosure of Fabis and Nishibayashi because it would enable the "other bonding methods," of Fabis and Nishibayashi and provide a snug fit with no adhesives or binders.

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The art made of record and not applied to the rejection is considered pertinent to applicant's disclosure. It is cited primarily to show inventions similar to the instant invention.

**For information on the status of this application applicant should check PAIR:**

Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

**Alternatively, applicant may contact the File Information Unit at (703) 308-2733. Telephone status inquiries should not be directed to the examiner. See MPEP 1730VIC, MPEP 203.08 and MPEP 102.**

Any other telephone inquiry concerning this communication or earlier communications from the examiner should be directed to David E. Graybill at (571) 272-1930. Regular office hours: Monday through Friday, 8:30 a.m. to 6:00 p.m.

The fax phone number for group 2800 is (571) 273-8300.



David E. Graybill  
Primary Examiner  
Art Unit 2822

D.G.  
13-Sep-05